



DATE: August 16, 1982

TO: Dan Goodwin

FROM: Tom Bierma

SUBJECT: Status Report on Granite City Lead Study

EPA Region 5 Records Ctr.



257715

History

Granite City was identified as the one Illinois "hotspot" in IEPA's 1981 State Implementation Plan for lead. Monitors in that city located at 15th and Madison Streets, and at 20th and Adams Streets, have indicated chronic exceedances of the $1.5\mu\text{g}/\text{m}^3$ quarterly average lead standard. From the time regular monitoring began, however, a general trend of improved air quality has been evident (see Figure 1). But in the fourth quarter of 1981, the average lead level increased to $7.27\mu\text{g}/\text{m}^3$ at the 15th and Madison site; nearly five times the standard and higher than any quarter previously monitored. Levels in the first quarter of 1982 dropped to a level roughly consistent with previous levels.

The high level found in the fourth quarter of 1981 was not the result of a single unusual sample. Table 1 provides the lead levels found on all sampling days in the fourth quarter for the 15th and Madison site. It is clear that the conditions causing the high persisted for an extended period of time.

The Ambient Air Monitoring Section has written an evaluation of the monitored levels. The evaluation has been appended to this report. Of particular importance is Figure 3 of the evaluation in which the range of wind directions has been marked for each monitor for high lead days during 1981 (in addition to the two monitors mentioned previously, the Roosevelt and Rock Road monitor recorded one month above $1.5\mu\text{g}/\text{m}^3$). Where these directions overlap, a cross-hatched area has been created. Contained in this area is the Taracorp facility and a number of associated potential fugitive sources of lead.

Taracorp is a secondary lead smelter, taking lead bearing scrap and reprocessing it into a variety of lead products including sheet and powdered lead, solder, and lead alloys. There are numerous point sources of lead including a blast and rotary kiln furnace, and a variety of kettles.

Major potential fugitive sources are the storage piles of lead bearing scrap and smelter wastes. The piles are estimated to cover an area of three acres to a depth of 30 feet and contain approximately 200,000 tons of material.

Recently, Battery Recyclers of Granite City, began operation adjacent to Taracorp. They have contracted with Taracorp to remove and recycle the waste piles. Operations apparently began last fall or Winter. The piles are roughly screened and transported to the recycling facility.

The reclaimable lead is sold back to Taracorp and the remains are ground up and piled in a vacant area adjacent to the recycler. This material has apparently been spread as ground cover over several acres of vacant property. It is not known how much lead is contained in this waste, nor is it known if it is being put to other uses.

Soil and dust samples taken in the past in the vicinity of Taracorp have contained from 300 to 3,400ppm of lead. IDPH considers soil containing over 300ppm to be elevated and potentially harmful.

According to USEPA's Air Quality Criteria Document for lead, an ambient average air lead level of 7.3ug/m3 given certain assumptions about lead exposure from other sources, can produce blood lead levels of at least 20ug/dl in 20-30% of the exposed population, 40ug/dl in 1-15% of the population, and 50ug/dl in 0-5% of the population. Both USEPA and IDPH consider 30ug/dl to be the threshold for lead poisoning (i.e., exceeding the margin of safety). 40ug/dl is the point at which anemia begins to occur, and at 50ug/dl, neurological disorders can occur.

IDPH screened 670 children for lead poisoning in Granite City in the fall of 1979 and summer of 1980. Eighteen cases of poisoning were found, which was not considered excessive by IDPH in their preliminary analysis. However, they did state that all cases could generally be tied to one of three causes: 1) a deteriorating dwelling (and, thus, availability of high-lead paint chips), 2) a parent that worked for the lead smelter, or 3) living near the lead smelter.

Proposed Study

The purpose of the proposed study is to provide IIPA with sufficient information to determine the degree of hazard to human health posed by lead in Granite City, and to identify the relative contributions to that hazard of each lead source. The evidence must be of sufficient quality and quantity to support legal action if necessary.

DAPC has formed a work group to create and conduct the study program. This work group is composed of:

Steve Tamplin
Tom Bierma
Rangu Patel
Jim Kelly
Dave Kolaz
Joe Ajayi
Jeff Benbenek
Heidi Hanson

Steve Tamplin is chairing the group but has asked me to coordinate its activities on a day-to-day basis. In addition, there are numerous people in the Division which have, and will be, offering technical assistance.

Dan Goodwin
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The study has two major sections, 1) the quantification of lead exposure of Granite City residents from all media, and the relative contribution of the various lead sources to that exposure, and 2) quantifying the health hazard posed by the exposure.

The first part, quantification of exposure, will require an evaluation of exposure from air, water, food, soil, and the work and home environments. Primary among these will be the air medium. The sources of lead in the ambient air and their relative contributions must be indentified. Emission estimates must be made for these sources, and a thorough evaluation of the Taracorp and Battery Recyclers facilities must be conducted. We also hope to use Receptor Modeling, a fairly recent technique used to identify source contributions by comparing the relative elemental composition of TSP filters and particulates from various sources. This form of "fingerprinting" has been extensively studied by John Shrock, and he believes it can be effectively applied to the lead program. Additional monitoring will also be employed, and will include size-selective sampling.

Identifying exposure from other media will require water, soil, and vegetation sampling. We hope to gain the cooperation of IDPH in quantifying work and home environment exposures.

The second part of the study, quantifying health effects, will involve the estimation of effects based upon the exposure estimates and the toxicology literature, as well as the actual measurement of blood lead levels, and clinical varification of poisoning symptoms. There may be much additional information that can be obtained from IDPH's initial blood screening program, and a follow-up survey of some sort may be possible.

A detailed plan of study should be developed within the next week. It is estimated that the study could possibly be completed in six months but may take as long as nine months. Participation from DAPC, DWPC, DLPC, Emergency Response, Labs, and IDPH will be needed in the study, with primary time commitments from DAPC, ERU and Labs. Total IEPA resource expenditures are estimated to be 1.5-2 man-years, with 50%-75% of this time coming from DAPC.

If you have any questions, please contact Steve Tamplin or me.

TB/dlc

FIGURE 1 - QUARTERLY AMBIENT AIR
LEAD LEVELS

15th and Madison St. —————
20th and Adams St. - - - - -

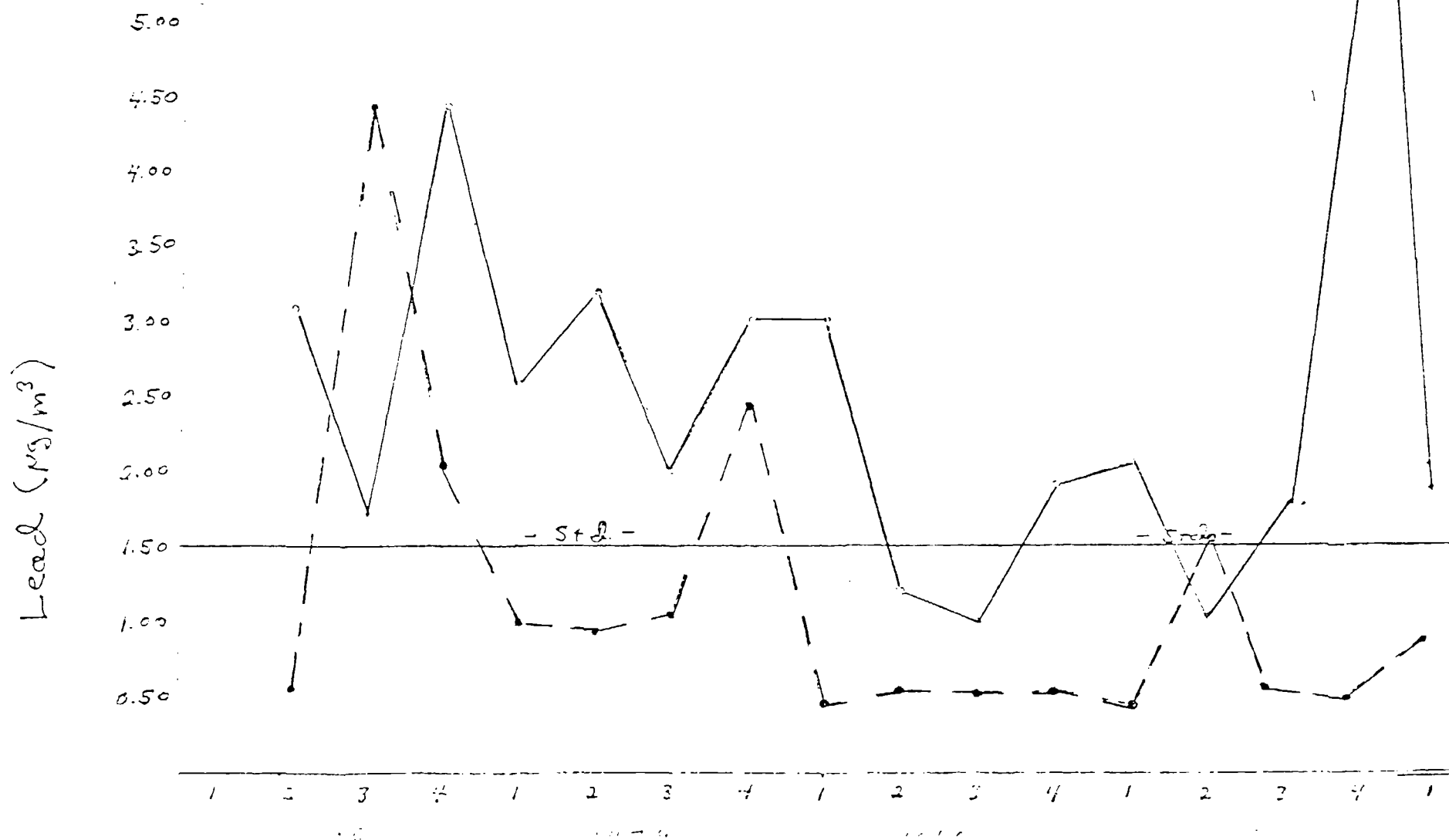


Table 1 24-Hour Average Ambient Air
Lead Levels at 15th and
Madison Streets

Date (1981)	Lead Level ($\mu\text{g}/\text{m}^3$)
Oct 1	22.0
7	1.1
13	0.61
18	11.0
25	0.75
31	0.63
Nov 6	30.0
12	1.1
18	3.0
24	1.9
30	0.38
Dec 6	1.1
12	2.3
18	32.0
24	0.83
30	0.72

AIR QUALITY BULLETIN

GRANITE CITY LEAD DATA SUMMARY - 1981

AQB 82 - 02

Prepared by: Ambient Air Monitoring Section
July 6, 1982

During 1981 two sites in Granite City which monitor for lead concentrations, violated the quarterly lead standard of 1.5 ug/m^3 . One other site exceeded the level of the standard for one monthly average. Because of the high nature of lead in Granite City, an examination of the high lead periods will be made to determine meteorological conditions associated with the high periods.

The two sites in Granite City which violated the lead standard were 15th and Madison with three quarters above the standard (1st, 3rd, and 4th) and 20th and Adams with one quarter (2nd) above. The site at Roosevelt and Rock Road had one month (August) above 1.5 ug/m^3 . Figure 1 is a map of the Granite City area depicting the locations of these sites.

Lead data for most IEPA monitoring sites is determined by compositing individual samples and obtaining monthly averages. By doing so the distribution of the lead on individual sampling days cannot be immediately determined. Thus, after high monthly composites are recorded, the individual samples are re-analyzed to determine which days had the highest lead. In the case of 20th and Adams, individual samples were analyzed all year during 1981. Table 1 lists the monthly and quarterly averages for all three sites for 1981. The quarterly averages for the sites with monthly composites are arithmetic means of the monthly averages. For sites with individual samples, the quarterly means are arithmetic means of all samples in the quarter not arithmetic means of the monthly averages. The highest quarterly average of 7.27 ug/m^3

recorded at 15th and Madison is nearly five times the standard and the highest quarterly lead average ever recorded in Illinois. During that period four sampling days had lead concentrations greater than 10 ug/m^3 with peak days of 32 ug/m^3 and 30 ug/m^3 .

In order to help establish the source(s) of the high lead levels, composite wind frequency distributions were generated for each site for days with lead concentrations greater than 1.0 ug/m^3 . For each site these distributions show those directions associated with the highest lead levels. The wind data used was from the IEPA monitoring site in East St. Louis when available and from the IEPA site in Edwardsville otherwise. Figure 2 is a graphical depiction of the composite frequency distributions. The site at 15th and Madison has major peaks from WNW to N, but additionally has some contribution from all directions. The average wind speed for all high days was 7.7 mph with a range of 2.8 - 13.9 mph. Thus, average wind speeds were generally higher than normal but did include some light wind periods. The site at 20th and Adams had a major peak from SE to SW but also had minor contributions from other directions. The average wind speed was 6.5 mph with a range of 2.8 - 9.4 mph. Again the wind speeds were somewhat higher than normal but did include some light winds. The site at Roosevelt and Rock Road recorded only three elevated lead days. On those days the winds were predominately from S to SSE at an average of 4.9 mph. Figure 2 also shows the wind distribution for 15th and Madison on the four sampling days when lead concentrations were greater than 10 ug/m^3 . On those days the predominate wind direction was WNW-NW at an average speed of 8.9 mph somewhat more elevated than the overall peak.

Figure 3 depicts the range of directions at each site for the peak directions on high lead days. The cross-hatch area is the overlap of key directions from the three sites. This area would be indicative of the most probable source(s) of the high concentrations. Taracorp Industries, a lead source, is located within the cross-hatch area. However, the directions on the maximum days (greater than 10 ug/m^3) at 15th and Madison indicate area sources in addition to the actual point sources that may have significant contributions. These area sources are lead battery storage piles associated with Taracorp and unpaved truck terminals and parking areas that may allow re-entrainment of ground-based dust. Lead analysis of dirt in these areas have indicated high lead content. The higher wind speed associated with the high lead days would also be consistent with area source impacts. Additionally, very few of the high lead days had any precipitation, and none of the four highest lead days at 15th and Madison had any precipitation, also consistent with area source impacts. Thus, it is likely that both point and area source impacts have contributed to high lead concentrations in Granite City in 1981. In order to help isolate the various sources, it would be useful to perform spectroscopic analysis on the hi-vol filters for the four highest days. Additionally, soil samples from various points around the area could also be analyzed for similarities. Thus, it may be possible to determine which sources, point or area, are having the greatest impact.

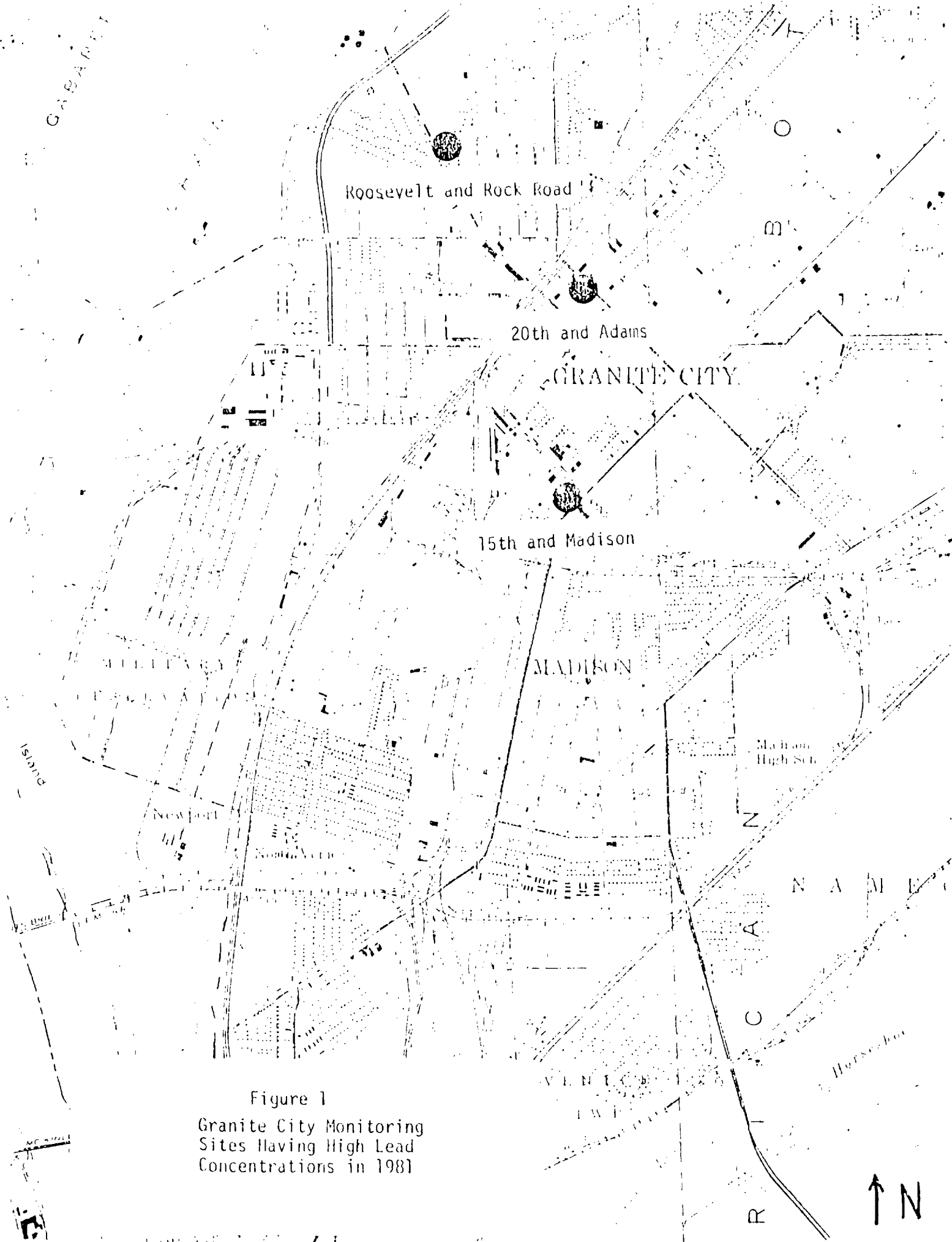
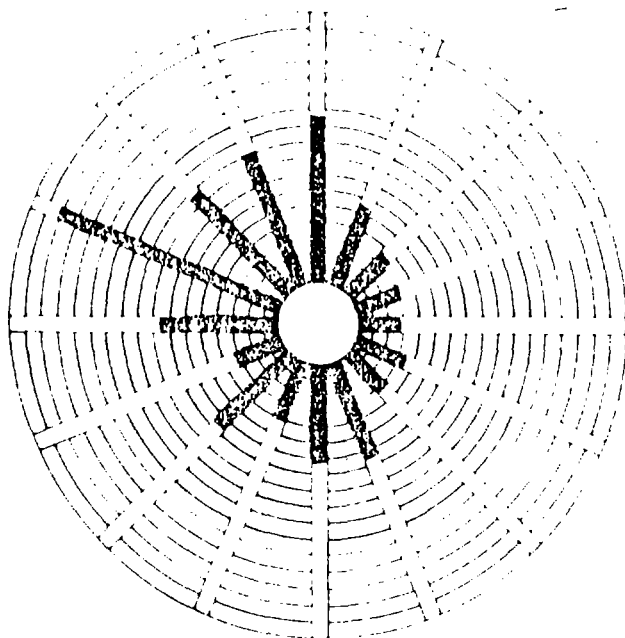
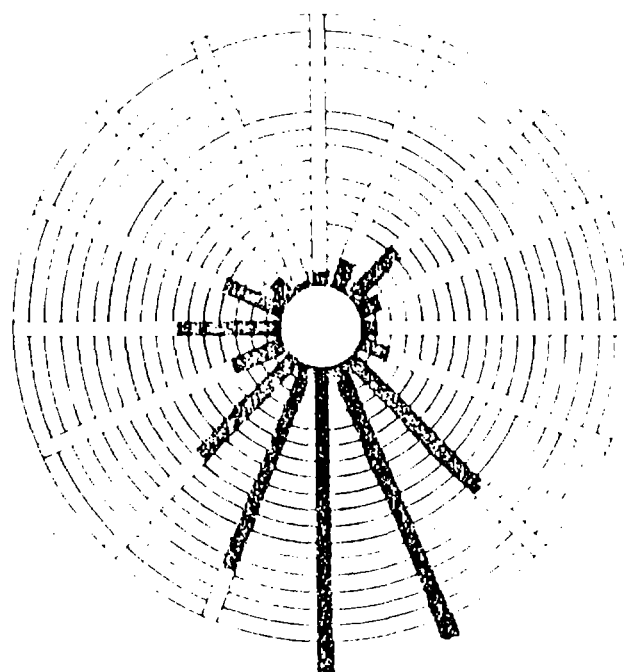


Figure 1
Granite City Monitoring
Sites Having High Lead
Concentrations in 1981

Figure 2
Wind Frequency Distribution
on High Lead Days in Granite
City During 1981

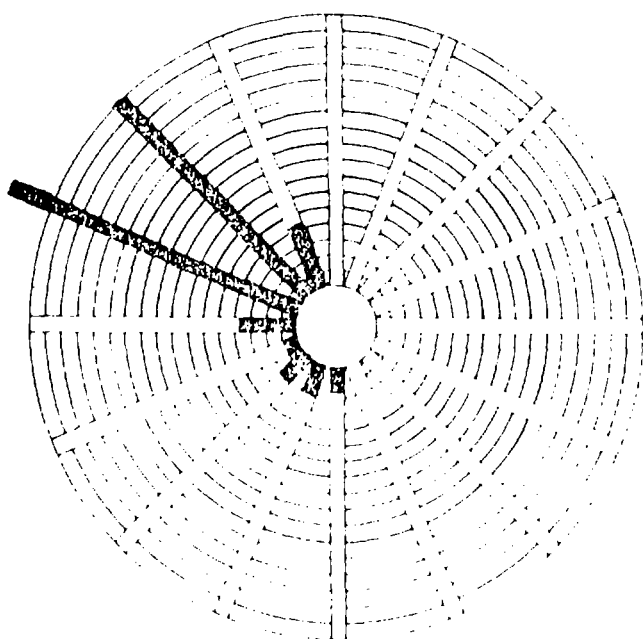


15th and Madison(all days)

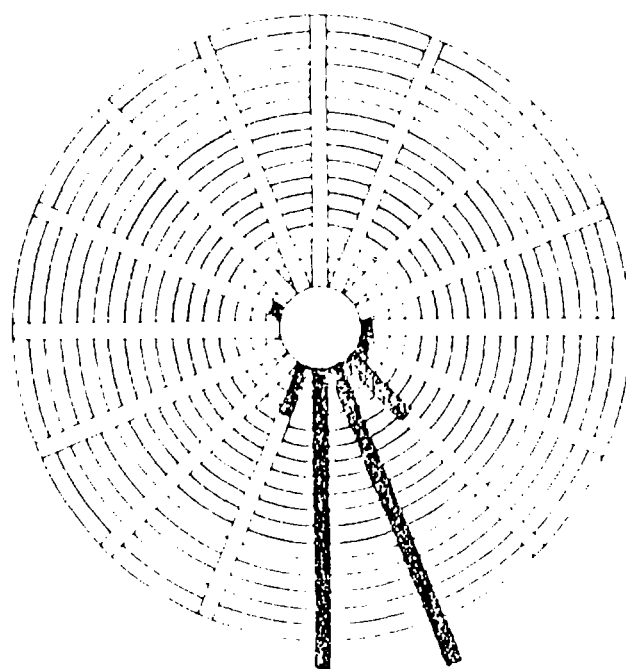


20th and Adams

Each line = 1%



15th and Madison(above $10\mu\text{g}/\text{m}^3$)



Roosevelt and Rock Road

Each line = 2%

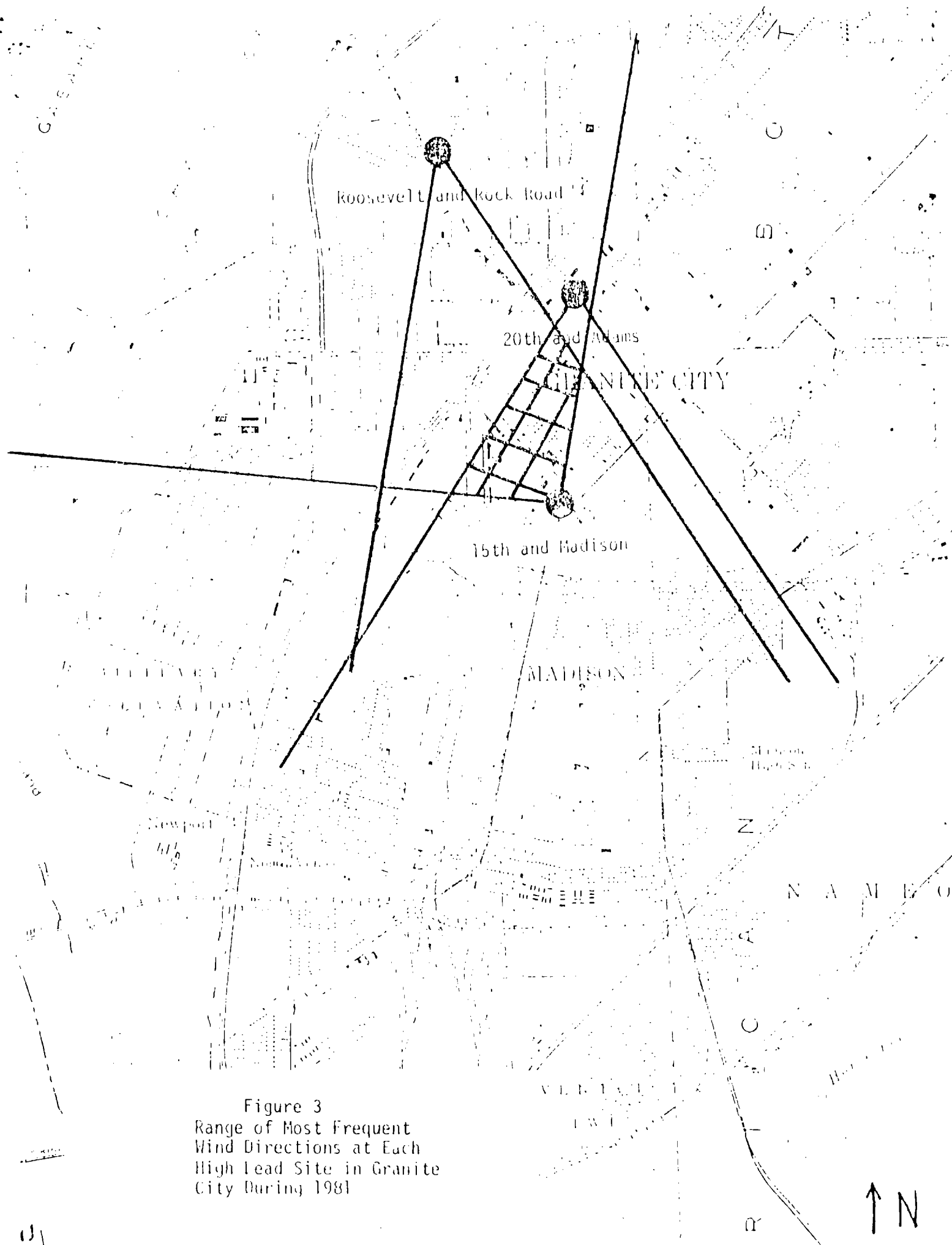


Figure 3
Range of Most Frequent
Wind Directions at Each
High lead Site in Granite
City During 1981

Table 1

1931 High Monthly and Quarterly Lead Averages
in Granite City

Month	15th and Madison (ug/m ³)	20th and Adams (ug/m ³)	Roosevelt and Rock Road (ug/m ³)
Jan.	2.30	0.29	0.37
Feb.	1.50	0.44	0.70
Mar.	2.40	0.62	0.33
Ave.	2.07	0.41	0.47
Apr.	1.70	0.43	0.73
May	0.67	2.67	1.10
June	0.73	1.40	0.71
Ave.	1.03	1.58	0.85
July	1.60	0.36	0.50
Aug.	2.60	0.73	1.60
Sept.	1.10	*	1.30
Ave.	1.77	0.55	1.13
Oct.	6.50	0.37	0.72
Nov.	7.40	0.67	0.69
Dec.	7.90	0.52	1.20
Ave.	7.27	0.53	0.87

* No data for this period

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